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A three node aircraft status fiber optic Local Area Network (LAN) aboard the USS Constellation will provide interior voice communication and data display information. Point to Point voice communication and data display information. Point to Point voice communications and aircraft status (normally done on translucent boards and grease pencils) will be supplied to various areas of the ship. System users fall into three categories. Two users, AIROPS and STRIKE OPS, will construct, modify and broadcast flight schedules; two users, CIC TAO and FDS, will be able to update selected display field e.g., launch time; the remaining users will be constrained to viewing a variety of display files. Each user can scroll through one of ten display files he wishes to view.

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VOICE MULTIPLEX SYSTEM (VMS)

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1. THE APPLICATION

A three node aircraft status fiber optic Local Area Network (LAN) aboard the USS Constellation will provide interior voice communication and data display information. Point to Point voice communications and aircraft status (normally done on tranlucent boards and grease pencils) will be supplied to various areas of the ship. System users fall into three categories. Two users, AIR OPS and STRIKE OPS, will construct, modify and broadcast flight schedules; two users, CIC TAO and FDC, will be able to update selected display field e.g. launch time; the remaining users will be constrained to viewing a variety of display files. Each user can scroll through one of ten display files he wishes to view.

2. SYSTEM

The system consists of sixteen user stations located in three areas of the ship: the Island, the CIC area, and the TFCC area (as shown in figure 1). A Bus Access Concentrator (BAC) in each of the three areas services the local users and links them with users in the other areas. Each station has a voice and a video terminal. A microcomputer connected to each BAC processes data and communicates with local data terminals and other microcoumputers. All data links use fiber optics, with singlemode fiber between BACs and multimode fiber from computers and terminals.

The system is composed of available hardware modified for this application. The LAN is a three node FOCON/A (Fiber Optical Communication Network/ Audio) that is built by Philips. All peripherals and computers are commercial equipment: the phones are Panasonsic speaker phones; the data terminals are WYSE-60s; the OPT (Operating Terminal) for FOCON is a DEC MicroVAX 2000 microcomputer; the three data computers are Zenith Z-248 microcomputers.

3. THE FIBER OPTICS

FOCON/A uses 850 nm multimode technology in the fiber optic elements of the stock BAC. NOSC modified the standard product by removing the existing circuit card and replacing it with a NOSC designed singlemode card. The multimode transmitter component was replaced with a singlemode pigtailed 1300 nm EELED (Laser Diode Inc.: LDT-60005) in a 14 pin DIP and its drive circuitry. The average power out of the pigtail is -20 dBm, at 25 °C, degrading by 5 dB maximum at +70 °C. The receiver has been replaced with a hybrid receiver (Sumitomo: DMR-52) in a 24 pin DIP with an ST optical receptacle. Data output is a TTL electrical signal with a BER less than 10 -9 for -32 dBm average input. The data rate limits for each transmitter-receiver pair are DC to 20 Mbps, NRZ. The entire board is form and fit to the specifications of the original.

The singlemode fiber interconnecting the BAC's is 9 um glass core, 125 um glass cladding step index profile, for use at 1300 nm. Its attenuation is no greater that 1 dB/km, and its dispersion coefficient is 3.5 ps/nm-km. The fibers are protected in a ruggedized cable (Optical Cable Corportation: B02-060E-S1XC/00-MIL). Each cable section consists of two of the singlemode fibers in 6.0 mm diameter cable. The outer jacket is flame retardent polyurethane. The core cable consists of aramid fiber strength members and two sub-cables. Each sub-cable consists of a hard elastomer jacket surrounding aramid fiber strength members and a single fiber, tight buffered with a 900 um hard elastomer coating. All connectors use in the singlemode links are ST type for singlemode (Dorran/3M: CYCON II). They feature an insertion loss of less than 0.5 dB.

All sub-node data communication will be done via fiber optic null modem RS-232 links. The optical/electrical interface is achieved through off the shelf modems (Optelecom: 4134P, Thomas & Betts: 9481 1G) operating at 850 nm, compatible with multimode GI fiber. The electrical side interfaces directly to DB-25 connectors on the therminal equipment, the package is similar in size and structure to electrical type DB-25 connector shells. Optical connections are done using

multimode ST (Dorran/3M: CYCON I). The bayonet, quick disconnect style features less that 0.7 dB insertion loss, good repeated mating performance and relatively easy termination. The cable (Optical Cable Corporation: D02-045D-W4DB/900) linking the modems is similar to the singlemode design. The multimode fiber is a 62.5 um glass core, 125 um glass cladding graded index profile. The maximum attenuation is 4 dB/km.

AIRCRAFT STATUS NETWORK
VMS/F.O.